AEC-NASA TECH BRIEF

Computer Program FPIP–REV Calculates Fission Product Inventory for U-235 Fission

The problem:

To design a computer program that will calculate fission product inventories and source strengths associated with the operation of U-235 fueled nuclear power reactor.

The solution:

A computer program that utilizes a fission-product nuclide library of 254 nuclides, and calculates the time dependent behavior of the fission product nuclides formed by fissioning of U-235.

How it's done:

The computer program requires two major inputs: (1) a library tape with the recorded physical constants of 254 fission product nuclides, and (2) the reactor operating history, power levels, and times after shutdown that inventory is required.

The Revised Fission Product Inventory Program (FPIP–REV) calculates the time behavior of 254 fission product nuclides formed by fissioning of U-235 resulting from a specified reactor operating history. The operating history can consist of as many as six separate operating periods, each at an arbitrary power level. The activity is calculated for each nuclide and summed for the total inventory. In addition, the program calculates the gamma and beta radiation energy source strengths (Mev/sec) in each of seven gamma and five beta energy groups versus time after shutdown (decay time). The energy limits of the grouping are arbitrary. Also the integrated gamma and beta source strengths (Mev) per group are determined for each decay time; the integration time extends from the decay time to a given fixed upper time limit.

The program has the following limitations:

(1) A maximum of 50 decay time points can be calculated per run. For multiple reactor startups the activity and source strength output data can be printed only for the time of final shutdown, or for decay times subsequent to final shutdown.

(2) A maximum of six separate operating periods can be used to describe the reactor operating history.

(3) The time interval for integration of the gamma and beta source strengths is arbitrary but is fixed for each problem. If varied integration time intervals are desired, the program must be rerun.

Notes:

1. This program is written in Fortran IV for use on the CDC 6600 computer.

2. Inquiries concerning this program may be made to:
   COSMIC
   Computer Center
   University of Georgia
   Athens, Georgia 30601
   Reference: B67-10450

Patent status:

No patent action is contemplated by AEC or NASA.